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these cells or groups of cells in grasses than in sedges. Perhaps we should expect this as most of the sedges thrive in wet places, where the conditions are uniform, while the grasses thrive in a much greater variety of places. Still we find a greater differentiation of parts in the leaves of marsh grasses than in the sedges growing near them.

Some of these characters in the leaves of grasses and sedges may be useful in description and classification.

EXPLANATION OF PLATE X.—The drawings are all diagrammatic and represent portions of the transverse sections of the leaf. Fig. 1, *Sesleria cærulea*; *a*, median strand of hypodermal fibres; *b*, median fibro-vascular bundle; *c* *c'*, lateral strands of hypodermal fibres; *e*, epidermis; *f*, bulliform cells when leaf is closed; *g*, same when leaf is open; *h* *h*, lateral fibro-vascular bundles; *i*, lacuna, $\times 120$ (Douval-Jouvé). Fig. 2, *Zea Mays*, $\times 17$ (Sudworth, in Beal's Grasses). Fig. 3, *Dactylis glomerata*, $\times 38$ (Sudworth, l. c). Fig. 4, *Poa pratensis*, $\times 75$ (Sudworth, l. c). Fig. 5, *Phleum pratense*, $\times 20$ (Sudworth, l. c). Fig. 6, *Leersia oryzoides*, $\times 350$ (Douval-Jouvé). Fig. 7, *Amphicarpum Purshii*, $\times 25$ (Sudworth, l. c). Fig. 8, *Panicum plicatum*, $\times 10$ (Douval-Jouvé). Fig. 9, *Andropogon prinoides*, $\times 50$ (Douval-Jouvé). Fig. 11, *Cyperus rotundus*, var. *Hydra*, $\times 55$. Fig. 12, *Kyllingia pumila*, $\times 55$. Fig. 13, *Fimbristylis autumnalis*, $\times 55$. Fig. 14, *Rhynchospora capillacea*, $\times 55$. Fig. 15, *Carex vulpinoidea*, $\times 46$. Fig. 16, *C. Pennsylvanica*, $\times 55$. Fig. 17, *C. Careyana*, $\times 55$. Fig. 18, *C. laxiflora*, var. *latifolia*, $\times 55$.

Hierochloa borealis.

WALTER DEANE.

A visit at Rye Beach, N. H., during the month of August, 1886, and an acquaintance with an Indian named Sabbatis Dana, who camps in the town every summer and sells baskets and other articles, have given me some interesting facts in regard to the *Hierochloa borealis*, or Holy Grass. It is one of our widely distributed grasses, ranging over the northern half of the United States and northward. In this section of the country, eastern New England, it is generally found near the sea shore, and is one of our earliest flowering grasses. I have collected it in the middle of May and, at that time, only the culm, rising from the creeping root-stocks, is visible. Later in the season, from the same root-stocks, at intervals of two or three inches, there grow radical leaves in tufts. In the months of July and August these leaves reach their full height. The length of the grass much surprised me, as I can find no mention made of it. I saw it three feet in

height, and I was assured that it grew much higher. In a salt marsh near by there was a patch of half an acre covered with this grass, its delicate green leaves, a quarter of an inch in width, contrasting sharply with the dark and wiry *Spartina juncea*, which covered the rest of the marsh. I can find no mention of these radical leaves, growing later from different parts of the original root-stocks, and I do not think that the fact can be generally known. At least it may be interesting to call it to mind. The dead culm and flowers remain standing erect during the season, hardly seeming to belong to the fresh over-topping leaves.

This grass, as is well known, becomes very fragrant when dried, whence its name, Vanilla Grass. Bigelow says, "This is one of our earliest grasses and is distinguished by the delightfully fragrant odor while drying." In Germany, on festival days, it is strewn before the doors of churches on account of its fragrance and is called, as the generic name implies, Holy Grass. These radical leaves are used very largely by the Penobscot Indians in the manufacture of their baskets, etc. Sabbatis Dana is one of the remnant of the Penobscot tribe, from 400 to 500 in number, who live at Old Town Island, Me., on the Penobscot river. In the summer time large numbers of them visit the various fashionable resorts and ply their profitable trade. Sabbatis has been at Rye Beach for twenty-six consecutive summers. The *Hierochloa borealis* is known among the Indians as Sweet Grass. There is no Indian name for it, even those Indians who know no other English using this name. They pick it in large quantities and hang it up in small bunches from the ridgepole of their tents to dry, the fragrance being much stronger if dried away from the sun. In this way, I was told, that the scent would last for years. The leaves, in drying, become strongly involute, making a fine pliable thread, very different in appearance and color from the fresh state.

The Indians do not know the plant in flower. Indeed, I was positively assured that it never flowered at all, the reason for this statement being obvious. For when the grass is gathered the flowers have long gone by. I showed Sabbatis the dead culms but, looking wisely at them, he shook his head and said, "That is not Sweet Grass." He had seen those amongst the leaves, but they did not belong to the grass, and he refused to be convinced until I produced a specimen with the old culm and fresh radical leaves rising from the same root-stock. Then he was much surprised and interested. Of course, in pulling up the leaves as they do, but little, if any, of the root-stock remains attached. The Indians know the grass by experience, the base of each tuft, in the fresh

plant, being quite red in color after the outermost leaves are removed. They always carefully pick over the grass when brought home, stripping off the older, outer leaves which, they say, have no fragrance.

In using the grass it is generally braided into strips as fine or as coarse as they require, and of any desired length, and is then woven into baskets and other fancy work. As it takes a good deal of time to pick the grass, dry and braid it, the Indians often buy it of those who gather and prepare it for sale, paying for it so much a pound. The wood used, which forms the main part of these articles, is white ash, *Fraxinus Americana*, and red maple, *Acer rubrum*, called in Maine white maple. These woods they prepare at home, splitting the ash into strips of the requisite thinness and width by means of a machine. The maple is used for the heavier parts, such as the frame work and handles. The pieces are stained with some coloring material and are then ready for use. Baskets and articles of that sort are always made over a block to preserve the shape, and I was told that it would be impossible to make a basket, with Sweet Grass in it, without a block, as the grass would draw the basket out of shape. I saw some very delicate specimens of weaving. They frequently use horse hair in making very small baskets for charms, being less than half an inch in width; the frame work is of ash and the weaving is almost microscopic. I noticed among the articles for sale in the Indian tent, some small boats, beautifully cut out of white cedar or arbor vitae, *Thuja occidentalis*, while the bark of the paper birch, *Betula papyracea*, was made into baskets, music rolls, etc.

Notes on *Carex*. VIII.—Hybrids.

L. H. BAILEY, JR.

(WITH PLATE XI.)

CAREX ARCTATA $\times$ FLEXILIS.

C. Knieskernii Dewey, Sill. Journ. 2d ser. ii. 247. *C. arctata* $\times$ *formosa*? Bailey, Proc. Amer. Acad. Arts and Sci. xxii. 104.

In a recent trip to the northern boundary of Minnesota, I found a quantity of this rare *Carex* and growing in such intimate association with *Carex arctata* and *Carex flexilis* that all doubt was at once removed as to its parentage. I had long been confident that the plant is a hybrid, and that *Carex arctata* is one of